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MOBILE RADIO
TECHNOLOGY

JANUARY 2002

Volume 20, Issue 1

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Interconnection between networks remains complex, even if carriers have reached some agreements. See page 30.



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Dealing with a rude neighbor

Robert H. Schwaninger Jr.

In what must be viewed as hubris squared, Nextel Communications has proposed a reshuffling of spectrum usage and licensing to "solve" public safety interference problems.



Turbulence eases for E.F. Johnson as company scores successes

Don Bishop

Highlights for the E. F. Johnson Company during 2001 have included a large contract to supply mobile units to South Dakota, customer acceptance of several 800MHz trunked public safety radio systems and a return to positive cash flow.

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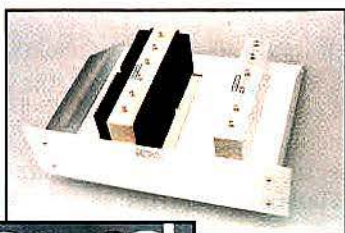
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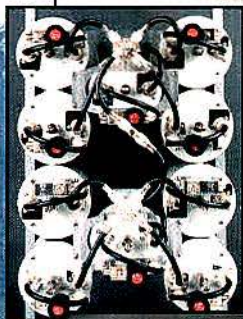
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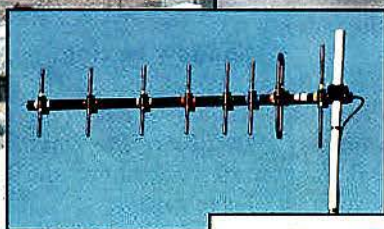
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Round One, and B&I's already on the ropes

Fighters.

You got your heavyweights, your middleweights and your lightweights.

When it comes to fighting for allocations of electromagnetic spectrum, broadcasters and wireless telephone carriers are the heavyweights; public safety agencies are the middleweights; and business and industrial radio communications service providers and users are the lightweights.

When the B&I radio industry segment wants to get some spectrum, it gets the best results when it can align itself with one of the heavier fighters. For example, B&I won some spectrum at 700MHz, the "guard band" spectrum, by showing how it would be a better neighbor for public safety users than wireless telephone carriers. B&I systems would cause public safety radio systems less interference, if any.

Wireless telephone carriers argued that there should be no guard band at all, but they lost to the persuasiveness of the public safety segment. The 6MHz that went to guard band managers otherwise would have gone to the wireless telephone carriers, you see.

What's on TV?

TV broadcasters, meanwhile, won rights to use one individual channel for digital television for each existing analog channel, and got the digital channels for *free*. They sit on the sidelines on this latest controversy involving interference to 800MHz public safety and B&I radio systems caused mostly by signals from Nextel Communications cell sites.

Under the advice of "Ask for the moon; somebody might give it to you," Nextel has asked the FCC to move everybody out of its way and give it perhaps \$10 billion to \$20

billion worth of spectrum in exchange for a \$500 million payout from Nextel's treasury to public safety agencies and 10MHz of Nextel's spectrum from various parts of the 700MHz, 800MHz and 900MHz bands.

And the B&I service providers



and users? Let 'em pay for their own equipment modifications to get out of Nextel's way.

It smacks of divide-and-conquer. And it works so well with the radio communications industry.

Representatives of the public safety segment should be careful, though. Some of them have quickly embraced the Nextel proposal. That 10MHz of extra spectrum sounds mighty tempting. And a promise of \$500 million sounds good, too.

One of the other heavyweights, the wireless telephone segment, isn't so happy, though. Where some of the other carriers might have to bid billions of dollars for spectrum at 2,100MHz, this proposal of Nextel's would give the company that delicious slice for pennies on the dollar. And who knows when the pennies would have to be paid? Sweet.

One of B&I's best hopes is to persuade the public safety segment that Nextel's proposal isn't as good as it seems to believe. Most public safety users are at VHF, anyway,

with little prospect of relocating to the higher frequencies.

The rest of the public safety users who might move to the higher bands now have been handed a bucketful of uncertainty to explain to the holders of their government purse strings.

Do any agencies have projects pending for 800MHz NPSAC frequencies that would have to be vacated? Try explaining why those should go forward. Oh, because they can be moved to 700MHz later? Um, exactly when would that be? And at what cost? With what possibility of disruption?

We hesitate to mention it—well, maybe not much—but what about B&I access to at least half of Nextel's 4MHz portion of 700MHz guard band spectrum? When Nextel bought that spectrum, wasn't it required by law to make at least half of it available to B&I users? Nextel plans to give all 4MHz to public safety. What about its obligation to B&I users?

Shadow boxing

Watch closely. The FCC has been known to cut some deals in the shadows. The commission is the referee for now, and Nextel has a lot to gain.

B&I: Stick together. Don't let Nextel's proposal divide you among yourselves the way it has begun to divide you from public safety.

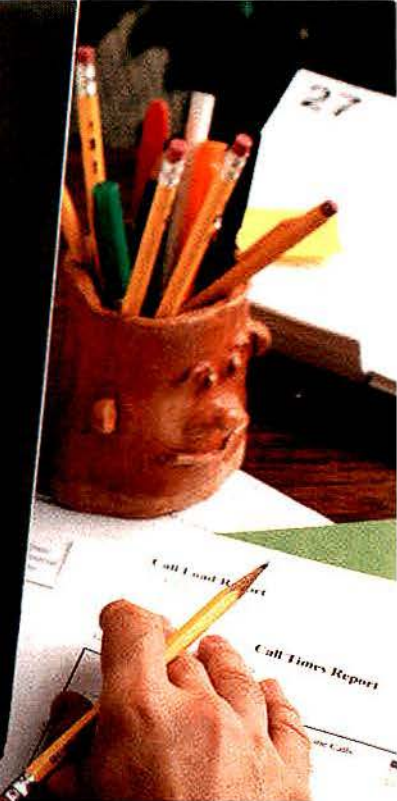
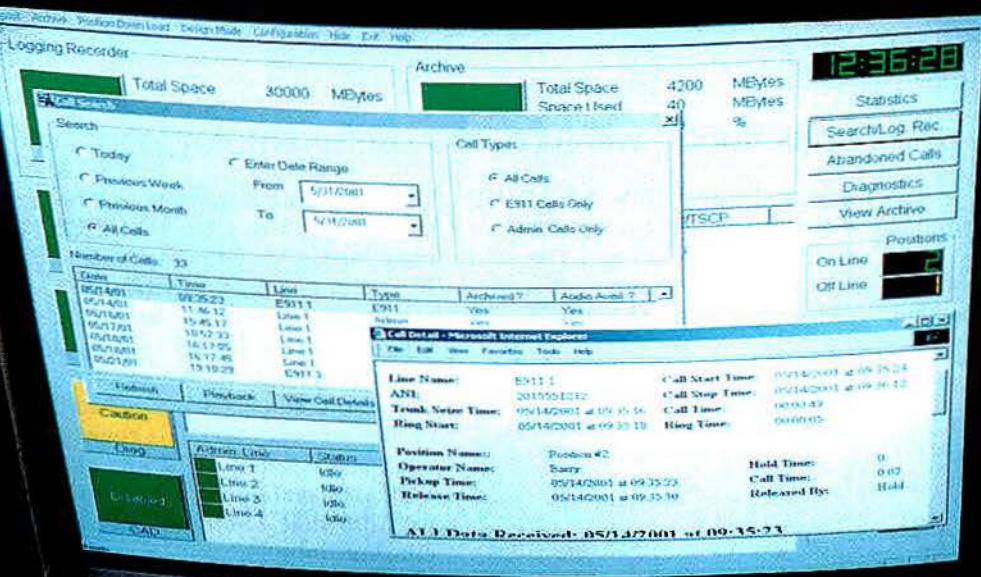
Public safety: Take a close look at Nextel's proposal. It may look like a gift, yet some gifts come with high costs. Don't fall for a sucker punch.

Don Bishop

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CIRCLE (6) ON FAST FACT CARD

'You never know when your hobby will turn into useful employment'

Thanks for pointing out in several articles (*MRT*, November 2001) that many two-way radio people got their start in amateur radio. I, for one, wound a crystal

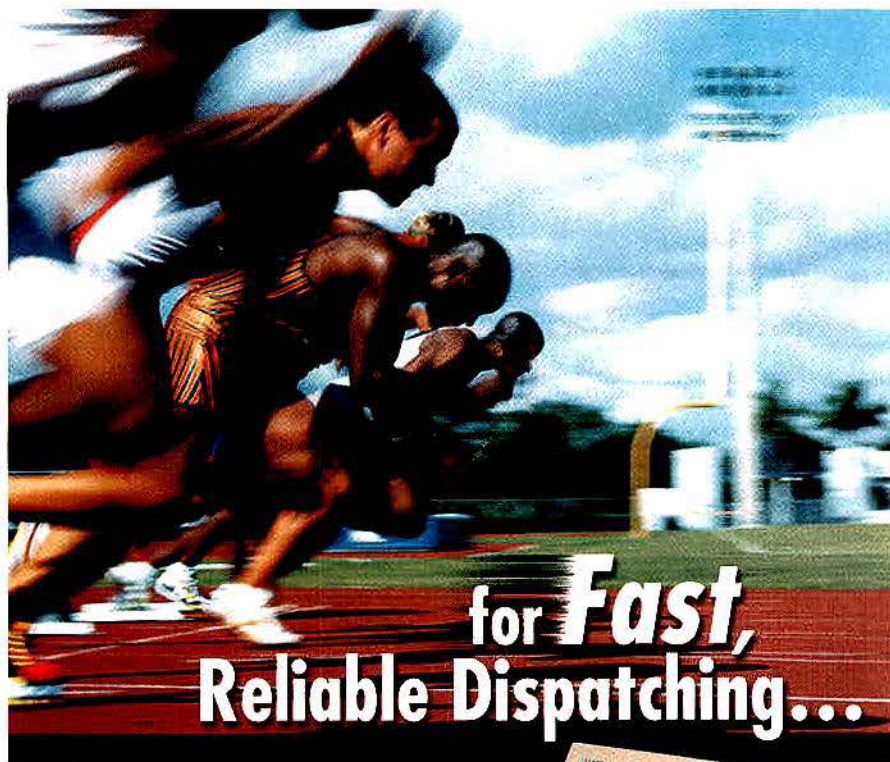
set in the early 50s, built a CB EICO kit in '57, got my amateur and MARS tickets in the mid 60s and started converting Motracs, Twin Vs and GE TPLs for

146MHz (amateur radio) operation. In the 80s, I built a GMRS repeater system for personal family communications. After I left aerospace engineering and found myself between jobs, I took on a technician's job for a local two-way radio shop. I installed and programmed an 800MHz county-wide public safety SMR and also a SCADA system for a local utility. After that, I entered sales, including Johnson and Motorola SMRs and site management for another two-way radio company.

Presently, I am employed at the Erie County Medical Center, a trauma, cardiac and burn treatment hospital serving western New York and southern Ontario. Erie County Medical Center is located on a 65-acre campus including two heliports and nine satellite clinics. I manage a computerized facility and security monitoring network, which includes 8,000 HVAC, power, security, and environmental points. When Y2K hit, my expertise again went into action to provide alternate means of communications. Following the terrorism attacks of Sept. 11, I was asked to investigate a contingent communications and covert security plan for ECMC. I am currently designing a radio, telephone, video and computer remote van in the event off-site operations are required.

You never know when your hobby will turn into useful employment, benefiting both your employer and yourself.

—Ronald Gilson
Technical Specialist
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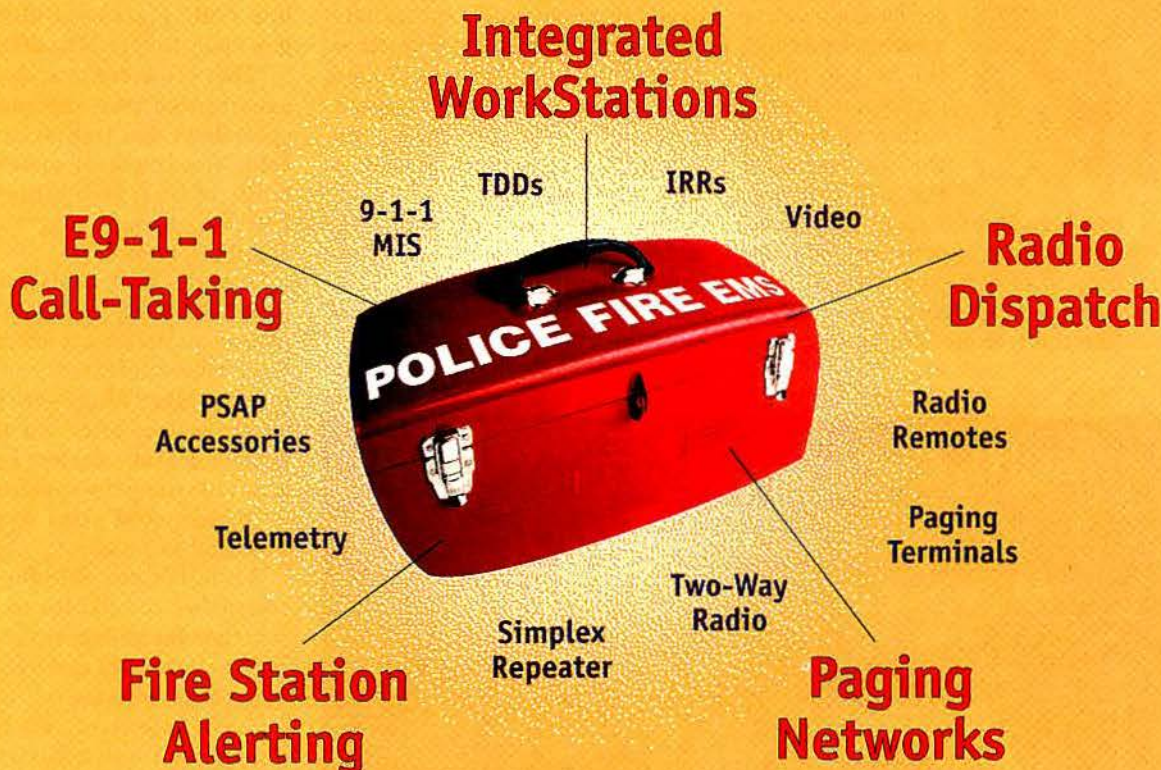
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Ever wish you could run a classified ad like that? Normally managers have enough to do without adding the task of filling an open position.

How do you find the best person for the job? Where do you look to find people with land mobile radio experience? Who has time to sort through a stack of resumes only to find none of them has the technical experience the

position requires? And the biggest question is "How am I supposed to get all this done?"

Here's one possible answer: Herb Gretz Associates is a recruiting company that conducts employment searches exclusively for mobile radio dealers nationwide. The company recruits experienced two-way radio sales specialists/managers and service technicians/managers on a daily basis. It offers networking and referral operations, and it reference-checks candidates before presenting them to a possible employer.

Allan Holt is the manager of the mobile radio placement division. Holt has been recruiting people for two-way radio manufacturers for more than 20 years.

Business eventually started slowing, however, when many manufacturers began switching to off-shore manufacturing facilities.

Holt then came up with the idea of serving mobile radio dealers. After four months of surveys to determine if dealers would be interested in this specialized service, the mobile radio placement division began operation in May 2001.

"There is a definite shortage of experienced two-way radio sales specialists and technicians," Holt said. "Good ones are somewhat difficult to find. In addition, many have very specific geographical areas of preference."

Overall, Holt said business is good. Because the mobile radio placement division is one of a kind, there's plenty of activity all over the country. Many dealers are planning on expansions after the new year, Holt said. Some dealers have even given the company standing orders for experienced sales representatives and technicians.

While it's possible for regular recruiting companies to conduct searches for mobile radio dealers, Holt believes his division has the advantage because not only does he have extensive experience in the mobile radio industry, but he also speaks the language.

So next time you're feeling weighed down with work and don't have time to hunt for a new hireling—don't stress. There are ways to manage the work. Find a recruiting service to help lighten the load.

Kari Taylor

Kari Taylor
Associate Editor

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CIRCLE (10) ON FAST FACT CARD

After the fire

By Robert H. Schwaninger Jr.

The forest of telecommunications stocks and companies was overgrown, with weeds choking the roots and stealing the nutrients from the strongest and oldest companies. Vines of speculation crawled over the ground and

was driven deeper into the dampness until it too could not be recognized beneath the twigs and twisted briars that tore at the bottom lines of wireless companies.

But all survived in a rain forest of financial largesse, which poured

billions into promises, speculation, returns on investment, public offerings, and the parade of Gs—2G, 2.5G, 3G and now 4G. But perhaps no disease was more fatal to the health of the forest than “killer app.” It spread from vine to vine and bow to bow, worming its way into business plans, short and long-term strategies, and into the mindset of the forest’s inhabitants. And it was thirsty.

Killer app drank great gulps from the financial rains and let rivulets fall to the floor to nourish the weeds, vines and, only tangentially, the oaks. Killer app poured buckets into short term investors’ pockets and si-

phoned off the fuel that was needed to maintain the health of the forest.

Rains level off

While the rains fell in abundance, the forest appeared green and healthy and lush. All appeared stalwart and growing and strong. But the undergrowth of the forest would not allow the roots to sink deeper and spread to make the oaks stronger.

Instead, the lushness was only a mildewed patina upon which the rays of reality would eventually fall and destroy.

In late 2000, the financial rains began to subside. Not all at once, but by noticeable degrees. A drier season had come and with it blew the low winds of change. It was as though the inhabitants had forgotten to honor the rains. Their neglect offended the rains.

The dry winds blew away the seeds of start-ups and evaporated the new money needed to sustain the green luster of the forest. As the rain became less frequent, the twigs on the bows of the smallest growths dried, cracked and split. Still, the inhabitants did not take heed.

In the spring of 2001, in a torrent of wind and hue and cry, lightning hit the floor of the forest and a small fire began. It consumed the hopes of ISPs and fed quickly on the negative earnings of paging companies that had grown sick from years of unhealthy pricing. It raged against the stock prices of even the largest entities and tore a swath through the tangle of speculative companies that depended on a prolonged monsoon of financial rain.

Consuming fire

Kindling of arrogance that had accumulated on the forest floor went up like a tinderbox, and the cataclysm rose up and burnt off the bows of mighty Cisco and Lucent. Stripping the bark from AT&T, it moved through the industry, a fiery plague of justice to smote and cleanse the forest floor of the vines and weeds of false promises, short-term successes and dependence on debt.

In less than six months the fire burned up more than 30% of the market value of all wireless stocks. It destroyed the momentum of the tower companies, which quickly

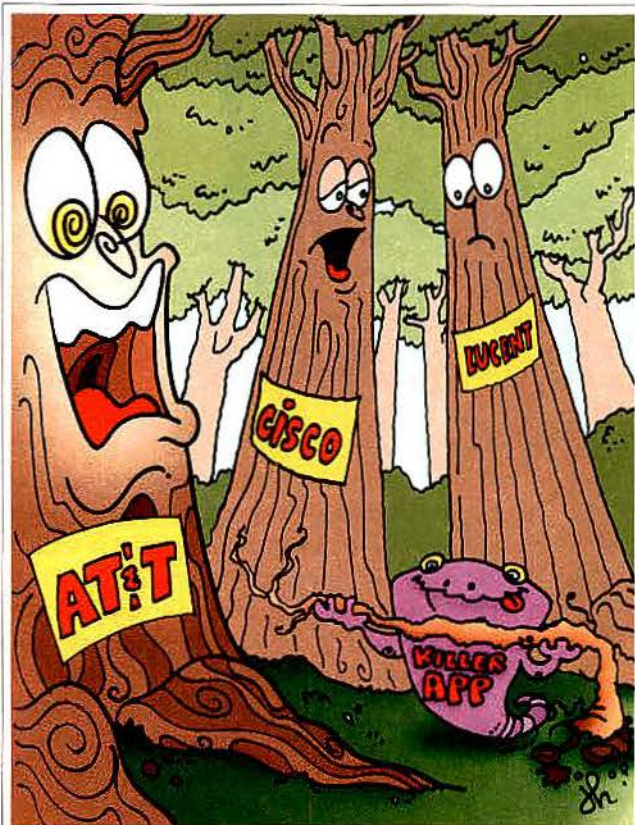


Illustration by John Hayes

“Well, THIS doesn’t look terribly promising!”

slithered up the trunks in parasitic delight.

Rot in the form of negative earnings littered the floor of this once vibrant forest. With an increasing gasp of dust and mold, profitability

Schwaninger, MRT’s regulatory consultant, is the principal in the law firm of Schwaninger & Associates, Washington, which is counsel to Small Business in Telecommunications. Schwaninger is also a fellow of the Radio Club of America. His email address is rschwaninger@sa-lawyers.net.

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CIRCLE (11) ON FAST FACT CARD

dug into the ground and buried their stems more deeply into asset performance, rather than the showier display of tower counts and alleged market share.

Rainmakers were called in to

beat the drums of "buy" and "strong buy," but their drums and cannons had no effect on the financial rains. The fire would be allowed to consume all but the strongest in its path, to bring down the pretentious and to

smite those that had lived long on arrogance and rejected the path of righteous business.

The gods of financial rain had spoken. This fire was repayment for the neglect and the failure of companies to pay closer attention to value creation, EBITDA margins, price/earnings ratios and the true impact of required capital expenditure.

By the end of the first quarter in 2002, the fire probably will have run its course. The tangle of weeds and vines should be cleared, and old wood will have been consumed in its devastating wake. The ash and debris left by the fire will fertilize the forest and remind the survivors of what is possible when tech companies start believing their own hyperbole.

A healthier industry is coming. For what does not destroy us makes us stronger. It is up to all of us to survive and to enjoy the financial rain that is slowly building on the horizon. It will not come in immediate torrents or cloudbursts of cash. It will come gradually, first in mists of opportunity and later in the cooling waters of financial wherewithal to create revived growth and hope.

The ions are being formed, and I feel a cooler, lighter breeze on my face. Let us pray that we are more respectful of the rain this time. ■

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A PRIMEDIA Publication

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CIRCLE (12) ON FAST FACT CARD

Zany ideas for a new year

Ain't it great to be in the radio business?

By David O. Dunford

Just when we thought the business end of two-way FM communications couldn't get any crazier, maybe it has.

First, Auction 40, the FCC's auction of lower band paging channels, has finally (and thankfully) concluded after a whopping 140 rounds. Demonstrating the

bitter independence of some small system operators, 10 rounds of bidding kept going with as few as *two bids*. Only about a third of the total BEA-pop-frequency-thingeers (basic

economic area) were sold, the remainder being retained by the FCC for future auction. About \$13 million was raised, not even "walking-around money" as FCC icons go, and several VHF and UHF paired frequencies went unbid. In fairness, the auction was really for the "white space" between incumbent operators, but numerous channel pairs (base and mobile authorizations) in the former Bell System allocation blocks appeared to go unnoticed. Because of wholesale abandonment of older IMTS systems, these channels are basically "clear" with tremendous opportunity for an entrepreneurial sort.

Jim Johnson, the cantankerous

engineering manager of Mobilfone Paging in Kansas City, MO, came up with a (initially, at least) good idea: Why not acquire the rights to these geographic licenses and lease them back, either as part of a hardware system or as part of a network service, to local government entities? Jim pointed out one ironic reality—it would probably be cheaper to acquire the whole BEA license than to pay for frequency coordination for only one system.

Dunford, MRT's public safety consultant, is technical services consultant for the Lenexa, KS, Police Department. He is a member of the Association of Public-Safety Communications Officials—International. You can email Dunford at mrt@primediabusiness.com.



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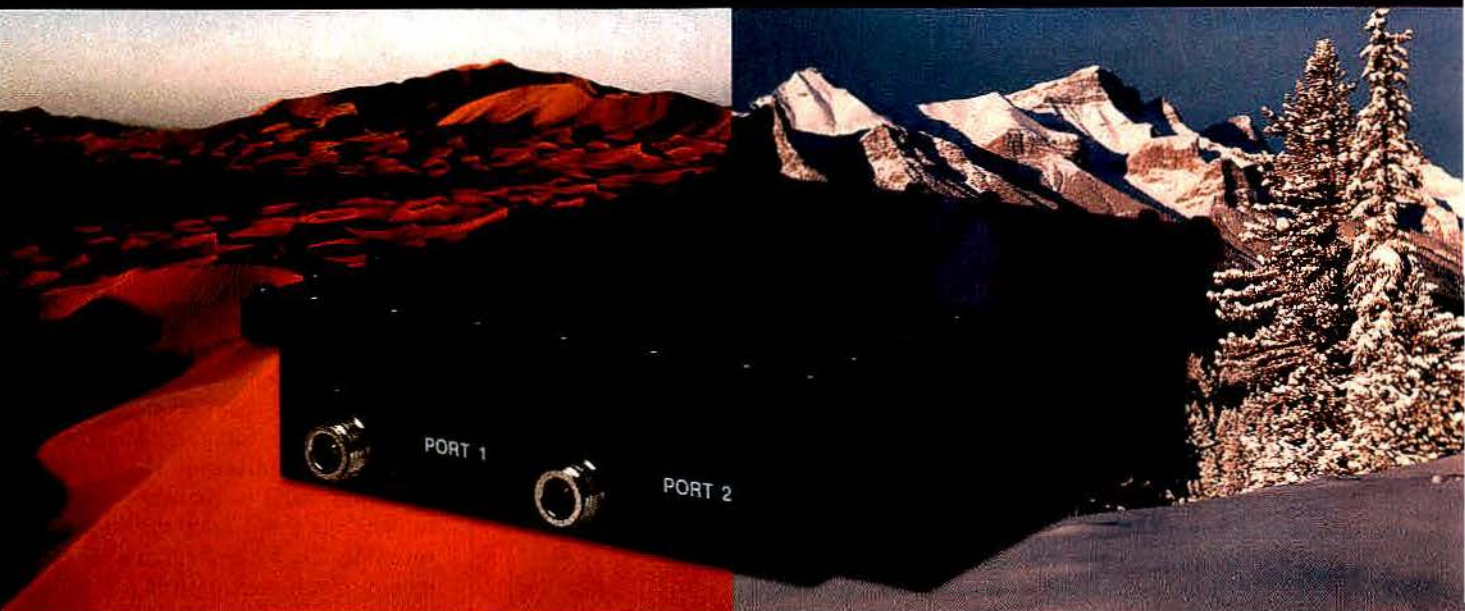


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CIRCLE (14) ON FAST FACT CARD

Several carriers expended small-to-medium bucks to "insure" their own operations by protecting the white space areas contiguous to their service and interference contours. But other carriers or speculators bid usurious sums to secure access to this new spectrum. The highest price I found in

our area was \$34k for a 10-year authorization to use just one UHF pair. *Someone has an optimistic outlook for the future of the independent Radioman.*

The second item of interest is the white paper submitted to the FCC by Nextel. It proposes to realign 800MHz frequency blocks



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involving public safety (which will involve realigning several thousand radios, as well). Nextel's idea is to shuffle the bands to provide contiguous blocks for similar services, and it appears to me that Nextel may be on to something. For its initiative, cooperation and trouble, all the company seems to want is an additional 10MHz of spectrum—and it appears willing to pony up about \$500 million for retuning. That sounds like a lot of money, but if your debt is \$13 billion, it's only another 3.8%. Besides, as someone once told me, "It's just Monopoly money, anyway."

Much like the almost unimaginable, and certainly unprecedented, Nextwave "deal-o'-the-century," which netted that firm about \$6 billion for *not* building a modern, "carrier's carrier" communications system, hustling up an additional 10MHz spectrum block seems a small price if it really would help out public safety.

Also part of this reallocation deal involves pitching the incumbent broadcasters off their 700MHz authorizations. A broadcast authorization may be a license to print money, but these folks have logistics problems too, not the least of which is "on what tower are we going to place the additional digital antenna?" Even if, as Walt Kelly's Pogo said, the "gummint" needs to help out, it certainly can't be any more costly than the Nextwave adventure. And with the prospect for a significant addition—and consolidation—of public safety spectrum, it's a far cry better expenditure of FCC staff time and gummint money. ■

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CIRCLE (15) ON FAST FACT CARD

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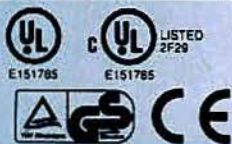
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SS-12	10	12	1 1/4 x 6 x 9	3.4
SS-18	15	18	1 1/4 x 6 x 9	3.6
SS-25	20	25	2 1/4 x 7 x 9 1/2	4.2
SS-30	25	30	3 1/4 x 7 x 9 1/2	5.0

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2 1/4 x 7 x 9 1/2	4.2
SS-30M*	25	30	3 1/4 x 7 x 9 1/2	5.0

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-10	7	10	3 1/2 x 19 x 9 1/2	4.3
SRM-12	10	12	3 1/2 x 19 x 9 1/2	4.7
SRM-18	15	18	3 1/2 x 19 x 9 1/2	5.0
SRM-25	20	25	3 1/2 x 19 x 9 1/2	6.5
SRM-30	25	30	3 1/2 x 19 x 9 1/2	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3 1/2 x 19 x 9 1/2	6.5
SRM-30M	25	30	3 1/2 x 19 x 9 1/2	7.0



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2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
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WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3 1/2 x 19 x 9 1/2	10.5
SRM-30M-2	25	30	3 1/2 x 19 x 9 1/2	11.0



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SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

CIRCLE (17) ON FAST FACT CARD

L.A. on alert: Preparing for the worst

The terror attacks on New York and Washington on Sept. 11 served as a wake-up call to other metropolitan public safety communications officials.

By James Careless

Vulnerability is the threat that has dogged public safety networks since the Sept. 11 attacks.

Small wonder: The World Trade Center collapse destroyed 98 radio

same questions: Could it happen to us? If it did, how bad would it be? How would our networks cope?

Los Angeles has been considering these questions carefully. Fortunately for the 3.7 million residents who live here, the answers are reasonably reassuring. Los Angeles is a city that has constantly been bracing itself for disaster—admittedly of the natural, earthquake-style variety—and so it is also well-positioned to protect itself from terrorist attack.

LAPD's radio networks

The Los Angeles Police Department has a big turf to cover: 460 square miles over a wide variety of terrain.

To do the job, the LAPD uses "about 10 transmit and 23 receive towers spread throughout the city," said Sergeant Kurt Miles, the officer-in-charge of the LAPD's master radio system.

"We have two separate and distinct systems in place. One is a

Motorola Astro digital voice UHF service (450MHz–512MHz); the other is a mobile data service at 800MHz," Miles said. Both interface with Los Angeles' Emergency Command, Control and Communications Systems and the city's two

9-1-1 dispatch centers: one now in downtown Los Angeles, and the other yet to be opened in the San Fernando Valley.

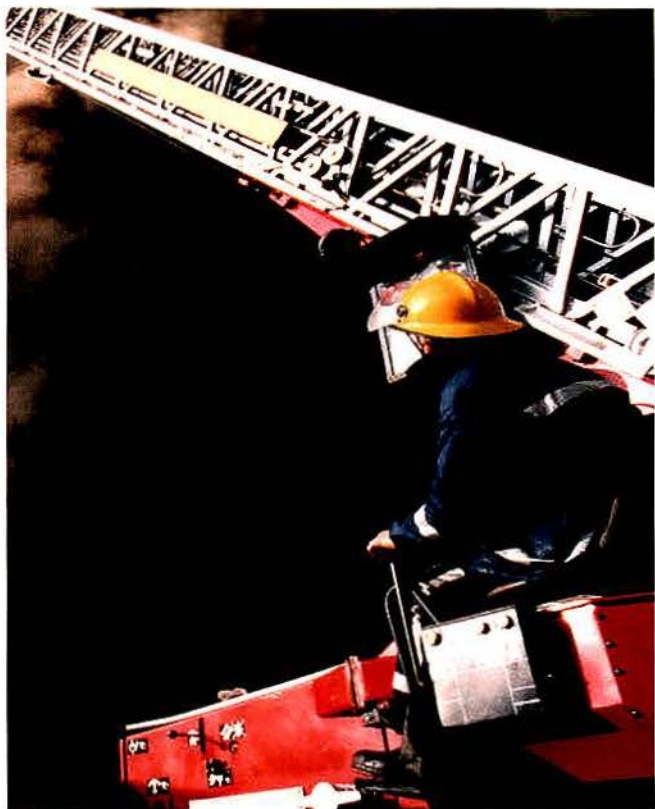
Still in the midst of deployment, the Motorola Astro system has been going through teething pains. In fact, complaints about reception problems have surfaced in the Los Angeles media, prompting the LAPD to issue a July 31, 2001, news release that stated, "The department is acutely aware of these concerns, and is working in a concerted, cooperative effort with representatives of Motorola to address these issues."

This said, when performing optimally, the Astro system provides the LAPD with a 57 UHF simulcast system. Providing service to about 10,000 hand-held radios—which double as in-car mobile radios—the simulcast system was chosen for economic reasons. "Even with the \$235 million bond that the public authorized in 1992, a trunked radio system would have been too expensive," Miles said. "Still, even with simulcast, we effectively have access to some 110 voice channels—quite enough for our needs."

The LAFD/EMS' radio networks

In contrast to the LAPD, the Los Angeles Fire Department and EMS operate on an 800MHz Motorola analog radio system.

"We have 18 channels available for exclusive fire and EMS use,"



Los Angeles has braced itself for any disaster—natural or manmade. The L.A. Fire Department and EMS have 18 exclusive channels.

antennas, including some belonging to the Port Authority of New York and New Jersey, the New York State Police and the U.S. federal government. Since then, police, fire and EMS agencies have all been asking themselves the

Careless is a freelance telecommunications writer based in Ottawa, ON, Canada. His email address is james@tjtdesign.com.



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CIRCLE (18) ON FAST FACT CARD

said Battalion Chief Thomas H. Franck, section commander for the LAFD's radio section. "We have nine primary simulcast transmitter sites throughout the city, plus one alternative backup site." All 10 sites have battery and generator backup systems.

To date, the LAFD/EMS has about 1,600 hand-held radios in service, plus about 800 mobile units installed in trucks and ambulances. "We're currently deploying the new Motorola XTS 3000R hand-held, which is also analog," Franck said. "We've been testing it extensively

for about 18 months now, and hope to roll it out by year's end."

L.A.'s response to risk

Let's talk security. How vulnerable is Los Angeles' police, fire and EMS radio networks to a terrorist attack?

Well, thanks to the city's landscape—a mix of mountains and sea plains—the risk is minimal. To get signals everywhere, the city's public safety networks have had to build a decentralized transmission system.

This means that no single tower or transmit site is indispensable. In fact, the LAPD and LAFD/EMS networks are designed to survive site losses due to earthquakes.

"We have microwave repeaters that shuttle signals between sites," Miles said. "If we suddenly lose a tower, then we can bounce the signals onto another location."

Franck added, "We also have pretty good line-of-sight coverage with our hand-helds. Even if all of our towers went down, we can still manage on a region-by-region basis."

The LAPD and LAFD/EMS have designed their systems to fragment into small stand-alone networks, should a catastrophic failure occur.

A case in point: In this scenario, each of the city's 18 police stations would handle radio traffic for their respective LAPD officers. "In this way, our people would be able to talk to each other and coordinate their moves, without being dispatched by 9-1-1," Miles said.

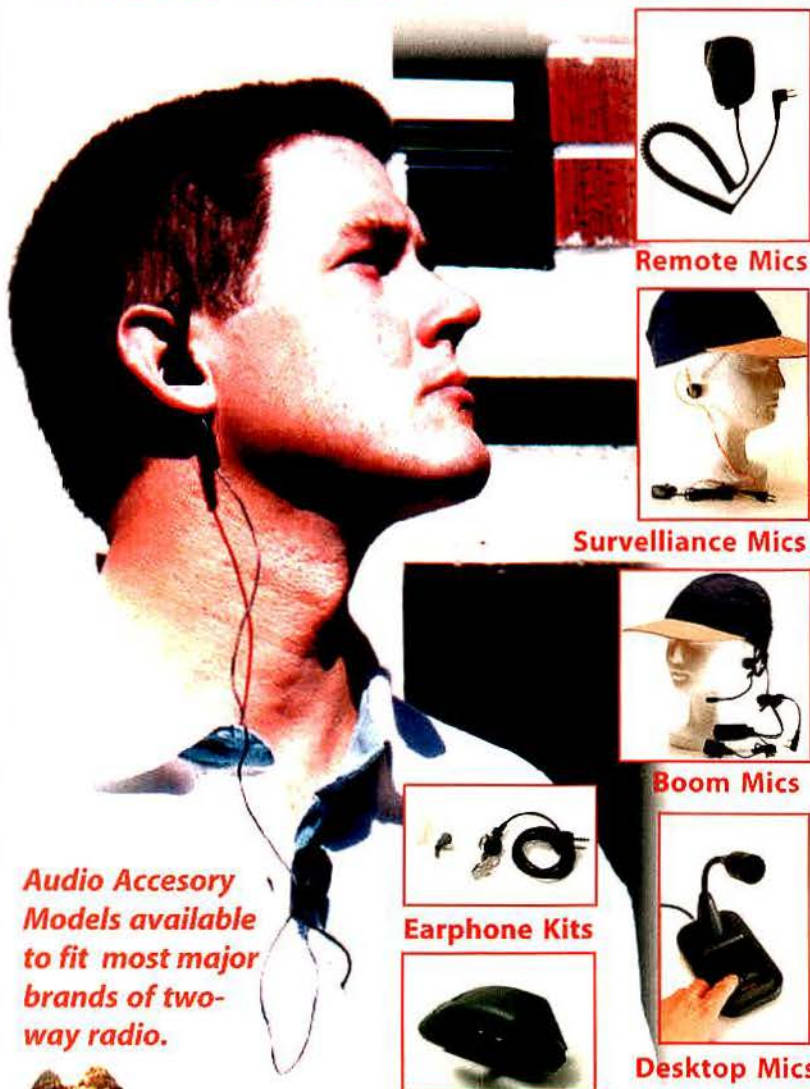
Meanwhile, the LAFD/EMS would cope in a similar manner, with each firehall taking over responsibility for its region.

"This approach allows us to cope with the complete annihilation of our dispatch centers either by terrorists or earthquakes," Franck said. "Granted, the system won't work as fast or smoothly, but it will function nevertheless."

Not interoperable, but interconnected

As noted earlier, the LAPD and LAFD/EMS aren't on a common radio system. Hence, in times of

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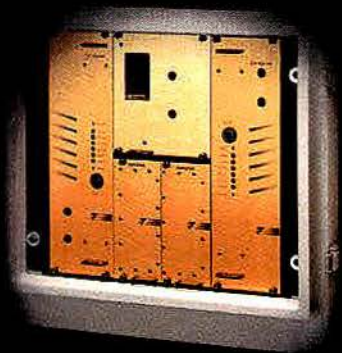
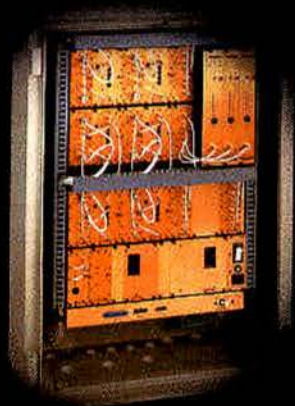
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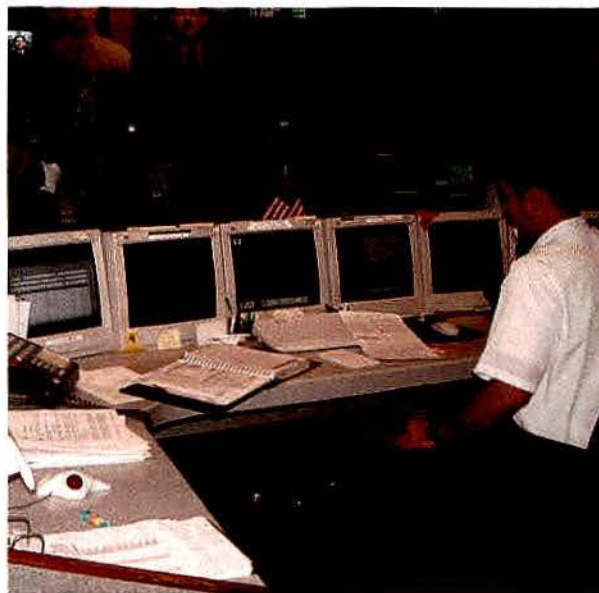
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The LAFD and LAPD dispatch centers are adjacent to one another, which keeps them in close contact. Pictured is the LAFD center (commonly known as OCD).

crisis, they could have trouble talking to each other.

To minimize this problem, the LAFD/EMS has bought enough Astro radios to put one into each and every LAFD/EMS vehicle. "This works pretty well in keeping us interconnected," Franck said.

As well, the fact that LAPD and LAFD/EMS dispatch centers are side-by-side keeps the two in close contact. Meanwhile, their physical location 60 feet below City Hall offers some degree of protection from attack.

This said, the LAFD/EMS has wisely chosen to take part in the National Institute of Justice's Office of State and Local Disaster Preparedness Services radio interoperability project. Thanks to funds from the

Department of Justice's AGILE program (Advanced Generation of Interoperability for Law Enforcement), the LAFD/EMS has purchased four TRP-1000 transportable interconnect systems from JPS Communications, Raleigh, NC.

The TRP-1000 operates as a kind of "telephone switch" for mobile radio networks. You plug in as many as 10 kinds of radios, and the TRP-1000's software switches calls back and forth between them.

"It was the Oklahoma City bombing that motivated the DOJ to fund the TRP-1000s," Franck said. "During that tragedy, the various public safety agencies had a hard time communicating with each other—all while coping with rumors of a secondary device waiting to explode at the scene."

Sept. 11 leads to some change

Taken as a whole, Los Angeles' networks are pretty well-placed to cope with terrorist attacks.

The Sept. 11 attacks still came as a wake-up call to the city. "It introduced a new paradigm for looking at catastrophic failures," Franck said. "For instance, how would we recall people to duty if our centrally located phone system was destroyed?"

The answer? The LAFD/EMS has duplicated all of its essential records and distributed them among various stations. In this way, even if the dispatch and back dispatch centers are lost, fire and EMS crews can keep doing their jobs.

Bottom line

In the wake of the Sept. 11 attacks, it would be wrong to say that any one agency is prepared for whatever happens.

However, with their distributed resources, backup plans and ability to function with the complete loss of command and control, Los Angeles' police, fire and EMS crews seem better able to cope than most. Living in the shadow of impending natural disaster, it's not such a stretch preparing for manmade holocausts as well. ■

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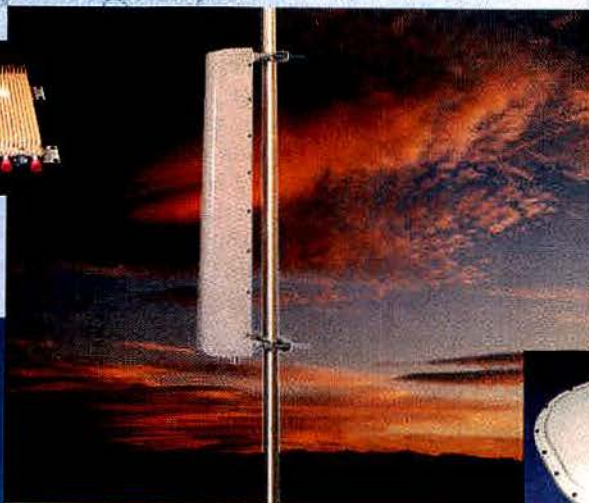
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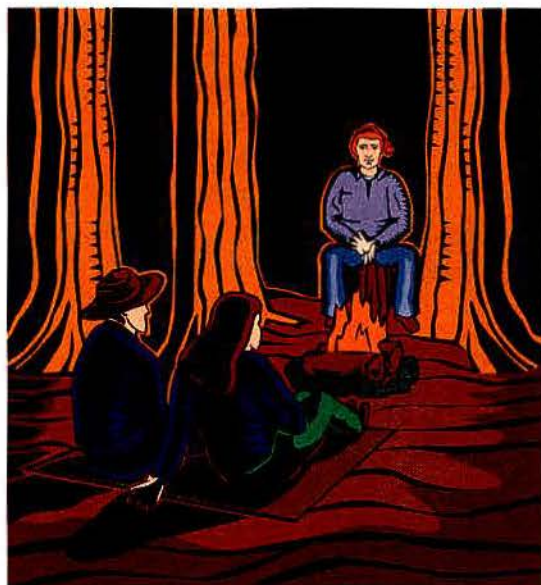
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Heartwarming interference stories

By Harold Kinley

Well, here it is 2002—my 10th year of writing this column. How time flies when we're having fun. To start the year, I am passing along a couple of stories about interference that came from readers. Stories such as these are priceless because much can be learned from the experience of others.

The first story was sent to us by



David Parcigneau, a radio inspector with the DOC in Montreal. David wrote:

"We just resolved a good interference case from which I was reminded of a few basic principles. The police of Montreal called us saying they had interference on two of their five 800MHz trunking system channels. We went to the site and, at first, didn't see anything. However, upon closer checking we did measure an average of 10dB of degradation in receiver performance on the two affected channels. Making sure that everything was well filtered, we installed an amplifier in front of our spectrum analyzer and saw a strange signal. It was weak and looked like frequency bursts.

"We then set out in an attempt to locate the origin of the interfer-

ing signal. We finally made progress on the corner of two streets that were in line with the affected police system located about one mile from the affected trunking site. We were able to receive it faintly in the truck at about 10dB above the noise level. It sounded like white noise. The key was to go with intensity using a whip antenna on the roof of the truck. We went back and forth pinpointing an area where the signal was the strongest.

"Then, using a portable receiver with a built-in signal strength meter, we went for a walk in the various buildings where we suspected the interfering signal was emanating. No success. We received something, but the signal level just wouldn't increase. In other words, we weren't getting any closer.

"We fetched a 10dB-gain yagi antenna from the truck and were able to get a bearing with it. However, we dismissed the indications it gave us because we just didn't pick up any signal at ground level at the location indicated by the yagi antenna. We thought the indication was just a reflection because this would be common in this frequency band—especially in a big city where the streets become waveguides because of the buildings.

"After walking through several buildings with no luck, we decided that we had nothing to lose by going in the direction indicated by the yagi. We went to the roof of the building indicated by the yagi and the signal 'went through the roof.'

"Eureka! We found it. The culprit was a cell enhancer for the interior of the building. It appeared that the amplifier was oscillating and generating spurious signals from 807MHz to 828MHz with bursts about every 2MHz."

According to David, the moral of the story is: "Don't take your theories for reality, even if they seem right. We thought it (the di-

rection first indicated by the yagi) was from a reflection, but it wasn't. Secondly, without *blindly* trusting it, trust your equipment. It might be right. We didn't receive anything at ground level. Why? Because we were in the null of the cell enhancer's yagi antenna. And at the point where we started, we were in the main lobe on the street corner a little farther away."

David further opined: "While there is still nothing to substitute for an experienced technician/engineer, a little lesson in humility is a good reminder of the basics."

Got any motor oil?

Bob Swinney once served as an FTR with Motorola. When he related this story to me via email, he was an RF engineer with Andrew. This story comes from Bob's days as a Motorola FTR. Bob wrote:

"It was in the early 70s, not long after UHF had become the new 'frontier' of land mobile radio. Motorola was king and its MSY station was the unchallenged leader of the pack.

"Heavily populated antenna sites and accompanying IM interference were becoming the norm. Some UHF stations came with a (two-isolator) circulator package, and I believe Motorola provided them free of charge to selected high-IM sites. Many of the circulator packages were not installed by the shops, particularly those that were not legitimate MSSs. It's hard to imagine now—a two-way shop that couldn't appreciate the absolute necessity of circulators.

Contributing editor Kinley, *MRT's* technical consultant and a certified electronics technician, is regional communications manager, South Carolina Forestry Commission, Spartanburg, SC. He is the author of *Standard Radio Communications Manual, with Instrumentation and Testing Techniques*, which is available for direct purchase. Write to 204 Tanglewyde Drive, Spartanburg, SC 29301. His email address is halkinley@charter.net.

"Intermodulation interference can take some strange turns on large antenna sites. In the early 'UHF' days, new FTRs were regaled with the story of a classic IM chase—the legendary Russ Larson. It seems that Russ had gone to Kansas City, MO, to help some poor FTR with an impossible IM problem on the largest Motorola site in town. The FTR had completely given up. All the UHF stations were equipped with circulators, yet the strong IM came and went—mostly came.

"It had to be an external mix, but where? It was quite strong and involved stations on the site. But all parties to the mix were protected. What's a poor FTR to do?

"Russ Larson was an engineer in Dallas at the time and had been dispatched to the Kansas City problem site. Russ arrives on scene and reviews all the procedures that

had been followed, to no avail, toward locating the terrible IM problem. Russ strolls over the rooftop for awhile, takes a puff on his pipe and says to the FTR: 'Got any motor oil?' The FTR answers: 'Well, yes. I carry a spare quart in the company car, but why do you want motor oil?' Russ simply replies: 'Go get some, I think it will help.'

"When the motor oil arrives, Russ takes the can and climbs up the back of a large metal sign, maybe some 10 feet to 12 feet high and situated on the edge of the building. He proceeds to pour oil down into the sign and almost if by a miracle, the IM goes away. Russ had found the classic rusty-spot: the nonlinear IM mixing point that we all have heard of but seldom ever see in the real world of RF."

Thanks to David Parcigneau and Bob Swinney for sharing their

stories. When you're out there looking for that interference source, keep an open mind. In some cases, finding the culprit is as much art as science. Experience doesn't hurt, either.

Until next time—*stay tuned!* ■

Web links

More useful sites:

Duane Vosburg recommends checking out www.hallelectronics.com. Click on "GE Tech Info" and then click on "Links." The "Miscellaneous Links" provide good information, as well. Thanks for the tip, Duane.

A good site for lots of Motorola-related information is www.batlabs.com/index.html.

Another Web site that I recommend is www.decibelproducts.com. From the home page, click on "Support." You will then find options for "db" tech notes, installation, software tools, FAQs and glossary.

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CIRCLE (24) ON FAST FACT CARD

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A fleeting glimpse

See how a Canadian trucking company looks to dispatch radio and paging to improve business operations in the forestry industry.

By Vaughn Entwistle

The next time you carry in groceries from your car, you might want to spend a moment or two thinking about the brown paper shopping bag you're holding. The bag material is known in the trade as "kraft paper" and comes from a useful byproduct of the timber products industry—woodchips.

How does dispatch radio tie in with shopping bags? Well, it turns out that radio communications plays an important role in this aspect of the forestry products industry in at least one location.

Lumberjacks and truckers

The city of Vernon lies smack dab in the middle of British Columbia's thriving timber business. Major mills include Riverside Forest Products and Tolko Industries. These larger mills, together with several smaller operations, provide more than 1,200 local jobs in logging and silviculture. Serving the transportation needs of all these mills is Vernon-based trucking company

DCT Chambers Trucking.

"We cover a wide cross-section of local businesses," said Jaime Skinner, dispatch manager at DCT Chambers Trucking. "We have a flat deck division where we haul steel, plastic pipe and other building materials, but probably 80% of our fleet carries wood residuals for saw mills, paper mills and particle board plants."

Thirty years ago, DCT Chambers Trucking began business with only two trucks. Today, it has grown to a thriving enterprise with a fleet of more than 200 trucks. Each truck has two drivers who work, in shifts, 24 hours a day, five days a week.

Where the rubber hits the road

With 200 trucks on the road at any given time, the trucking operation is a complex one, requiring dispatch and routing of trucks to pick up wood chips from the various mills and to deliver them to local paper mills. For years, DCT Chambers Trucking has used radio consoles to dispatch its fleet of

trucks. The consoles, from Redmond, WA-based Zetron, were originally installed by another Vernon company, VMR Communications. When it came time to upgrade the consoles to match the trucking company's growing needs, VMR Communications was again the vendor of choice.

"They had a model 4016 and a model 4018 with a model 4115 expander panel," said Wilfried Mulder, a technician with VMR Communications. "We took out the model 4016 and put in two model 4118s, kept the existing model 4115 and added another model 4115 so they have two identical positions now."

Get those truckers rollin'

To give an idea of the size and complexity of DCT Trucking's operation, the company currently employs seven full-time dispatchers.

Entwistle is editor of *Advantage* magazine for Zetron, Redmond, WA. A version of this article appeared previously in *Advantage*.

In it for the long haul

Unlike trucking companies in the logging industry, long-haul trucklines must look beyond dispatch radio (and paging) for their communications needs. They may rely on terrestrial communications for part of their operations, but most likely will resort to systems that use satellite, Internet technology or both.

Dispatch communications in trucks traveling beyond, and sometimes well beyond, the city limits may not use voice as much as they would data and messaging communications. Other functions that a fleet may need, which would go hand-in-hand with voice and data, are GPS, AVL and recording.

"Choosing a wireless service for your particular fleet is a complex process involving high stakes," wrote Jim Mele, editorial director of *Fleet Owner* in a 1997 article. "Not only does wireless communications require a substantial capital outlay for the necessary truck and office hardware, but it also requires a major commitment of resources to integrate the chosen service into existing or new information management systems."

However, once a company has made that commitment, wireless communications can quickly increase efficiency and productivity, improve customer service and affect the bottom line.

Many options are available to fleet owners, with packages ranging from simple dispatch features to more complex systems that feature dispatch, GPS, messaging and activity logging.

► **@Track Communications**, formerly HighwayMaster, offers the HighwayMaster Series 5000, which provides data messaging, voice communications and GPS, using satellite and cellular technologies. The in-cab components include a phone, data display and microprocessor. @Track, based in Richardson, TX, has established a network for the United States that offers mobile communications coverage in 98% of the available wireless service areas in the United States and 100% of the A-side coverage in Canada.

The microprocessor inside the mobile



unit enables complex operations and calculations to be performed inside the moving truck. This intelligence supports many of HighwayMaster's functions, including voice recognition, vehicle tracking, R-ETA, engine interface and automated fuel tax reporting. The host system can work as a stand-alone system, or as a part of a company's existing information applications.

► **PeopleNet Communications**, Minneapolis, provides an Internet-based fleet tracking and communications system, which features GPS, two-way in-vehicle data and voice communications, and business tools such as online routing and mileage and load matching. The PeopleNet g2x's components include the fleet manager Web link, an in-vehicle base unit (holds the transceiver and GPS receiver) and GPS and wireless antennas.

► **Qualcomm**, one of trucking's largest providers, offers a complete transportation logistics management system. The Fleet Advisor offers real-time wireless communications, full-function on-board computing, GPS and back-office software networking capabilities. The whole system consists of the in-vehicle software and hardware, used in conjunction with Qualcomm's communications service, FleetCom. The system elements are the on-board computer, fleet card and ground support system. FleetCom provides the

satellite or terrestrial wireless data communications between drivers and dispatcher.

► **Nextel Communications** can also provide fleet services. In November 2000, Nextel partnered with ActSoft, Datatrac, Intermec, Penchant Software and ServiceHub to provide its Online Plus customers with more Web-based dispatch and fleet management applications. Mobile Interactive Data Solutions from Datatrac allows users to send and receive free-form messages, status updates and job information through a Nextel Plus phone. ServiceHub is a Web-based service for dispatching, remote customer service, field service and supply chain communications.

► **IDA**, Fargo, ND, specializes in AVL products, such as its Trakit-25A, which provides expanded utility GPS tracking and data communications. It combines messaging, bar coding and full fleet management. Its Trakit-25D provides the same features over digital radio systems EDACS, APCO-25, Nextel and CDPD. IDA can provide hardware and software.

Before approaching any company about costs and services, fleet operators should evaluate what kind of information and the volume of information they expect to be exchanging on the road. They should also decide what functions they could use, such as vehicle location and activity logging. And they should not overlook the cost of integrating a wireless system with their existing information system.

—Nikki Chandler



Not only does DCT Chambers Trucking use pages and tones for dispatching, it also uses them to monitor the wood-chip bins.

The dispatch runs 24 hours a day during the week, with a single dispatcher working an eight-hour shift during weekends. Weekdays are proving to be so busy that the company will soon be running two full-time dispatchers day and night.

The Zetron model 4118 consoles support eight radio channels, one

using have a 5/6-tone page capability. When the truck driver pages in, his truck number comes up on the console screen so the operator knows which truck called in, on what channel they called in and in what order. Meanwhile, the console sends back an acknowledgment tone, indicating to the driver that the call has been received and to wait a few minutes for dispatch to call back."

Stack the decks

The model 4118's call stacking capability has proven to be a key feature in this kind of dispatch operation. As trucks call, in they are placed in a stack. When one of the dispatch operators hits a button, he sees the first truck that paged in. Each time a dispatcher reviews the page, it also clears it. To call another truck, the operator simply hits another button. The console can stack as many as 24 pages at one time.

"The dispatch also has the ability to call the trucks with a 5/6-tone burst," Mulder said. "The mobile receives the page and sends back a tone showing that the radio has acknowledged it. If the driver is out of his truck when the message comes in, there will be a call light flashing on his radio when he gets back so he knows to call the dispatch."

When the chips are down

The paging capability is also

being used to monitor the level of wood chips in the chip bins.

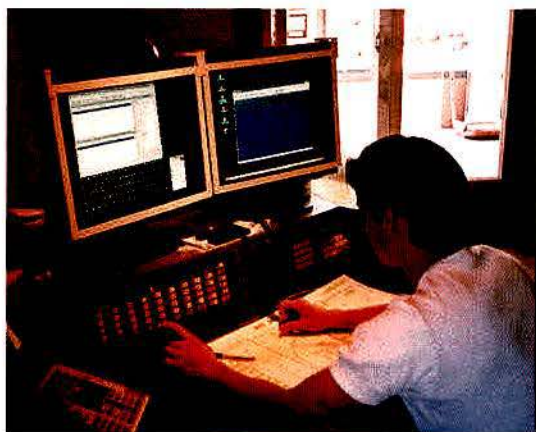
"Together with VMR Communications, we've developed sensors in various bins or silos at different sawmills where they store shavings or wood chips," Skinner said.

Located at each of the mills are chip bins that fill up with wood chips and sawdust. Mounted on top of the chip bins is a radio attached to a level sensor. Using DTMF tones, dispatch operators at DCT Chambers can interrogate each individual chip bin and receive a 5/6-tone reading that tells them the level in each bin. If a bin is full, operators then know they need to dispatch two trucks. Alternatively, if the bin is nearly empty, they know there is no need to dispatch a truck. Apparently, the system is surprisingly accurate.

"We've got it down to tenths of a meter," Skinner said.

As trucking companies grow, their communications needs change. DCT Chambers found dispatch radio and paging suited its needs perfectly. Other companies may require more functions such as vehicle location or activity logging, or less, such as simple paging.

Trucking companies make convenient shopping possible, transporting items from the materials used to make the brown paper grocery bag to the food inside. ■



The truck drivers check in via pages, which appear on the console. The operator sees the truck number, channel and what order the driver called in.

of which is through a local repeater. Two other repeaters use leased lines with remote radios. DCT Chambers Trucking also has one Internet link.

Mulder explained how commercial dispatching works at the trucking company: "The radios they're

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Interconnection's untested waters

Despite the FCC's Local Competition Order, which defined new interconnection rules for carriers, interconnection between networks continues to present complex issues.

By Vic Jackson

You may be surprised at some of interconnection's "untested waters." Shortly after enactment of the Telecommunications Act of 1996, the FCC issued the *Local Competition Order*. This edict spelled out new interconnection rules for telecommunications carriers.

After five years and many regulatory battles between local exchange carriers and potential competitors, including wireless providers, things have settled down a bit, interconnection-wise.

Wireless carriers have reached interconnection agreements that somewhat resemble the FCC's intentions in the *Local Competition Order*; nevertheless, interconnection between networks remains complex. Some controversial facets of interconnection are still being resolved by the FCC or federal courts. Some of the "untested" areas include:

- ❑ responsibility for SS7 connections.
- ❑ unbundled network elements for wireless.
- ❑ bill and keep for paging, cellular and CLECs.

SS7

Common channel signaling, which uses Signaling System 7 protocol, sends call set-up and other

information between the originating central office and the terminating central office in the public-switched telephone network. SS7 uses a separate packet data network to transmit the call data.

Call set-up information must be sent to process calls in any network. Unfortunately, the *Local Competition Order* was clear with respect to the responsibility for trunk facilities between networks, yet silent about who is responsible for the signaling facilities.

With two-way networks where traffic flows in both directions, the costs of the SS7 signaling data circuits are sometimes shared by both carriers, although in many cases the wireless carrier ends up paying for all of the signaling facilities.

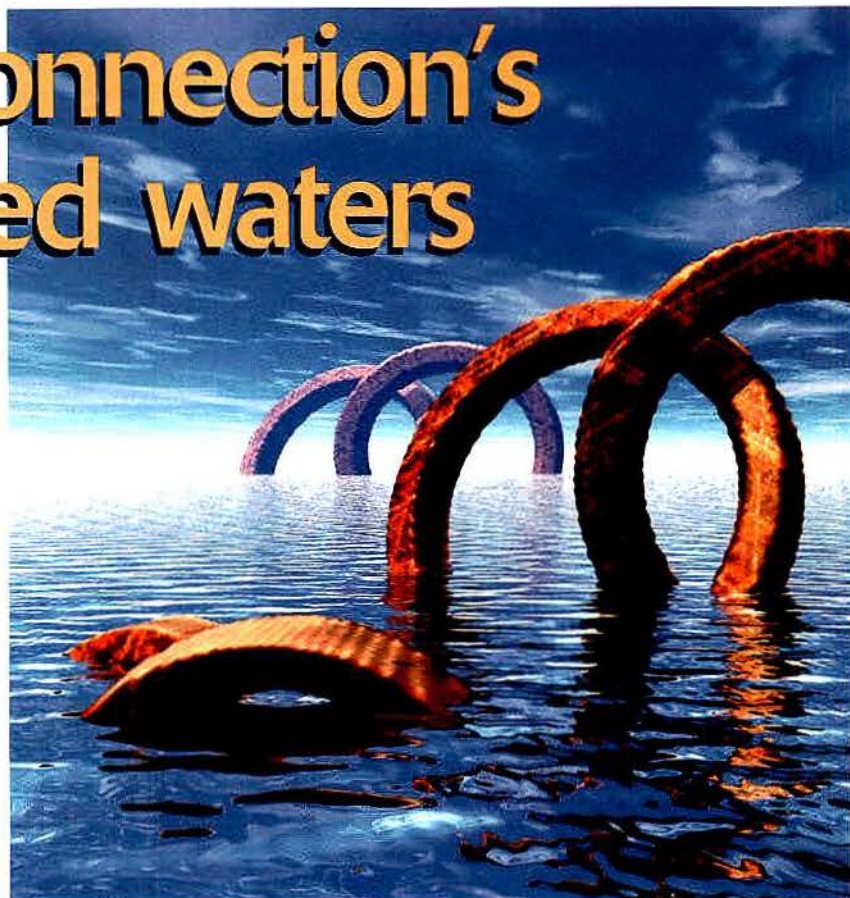
Uniquely, in the case of a paging carrier, all traffic is one-way, from landline to mobile, so shouldn't the LEC provide the signaling along with the rest of the call? It took the FCC's *TSR Wireless Order* of June 2000 and an appeal to federal court

(denied in June of 2001) to affirm that the LECs were responsible for delivering call traffic to the paging carriers. This responsibility includes the costs of trunk facilities up to the point of interconnection with the paging carrier.

However, if a paging carrier wants to use SS7 signaling, the LECs demand that the paging carrier pay for the SS7 data circuits. Logic would dictate that signaling is an integral part of any call traffic and, therefore, the carrier originating the call traffic should be responsible for the signaling trunks.

Unfortunately, almost all paging carriers use MF trunk signaling instead of SS7. But number portability is coming around the bend, and SS7 connections for paging may be a future necessary evil. If this happens, some paging carrier is likely to request delivery of SS7 signaling. It is just as likely that eventually

Jackson is president of Interconnection Services, Okemos, MI.





the FCC will be asked to interpret their rules on this obscure issue.

UNEs

Unbundled network elements are the prices charged for segmented parts or pieces of the LEC's network. In essence, UNEs are the wholesale prices charged for LEC facilities or services. Traditionally, competitive local-exchange carriers use unbundled elements from the incumbent LEC to offer subscriber line services to their customers.

For example, the subscriber landline from the LEC central office to the residence or business location can be "unbundled" so the CLEC can connect the line to its own services. UNEs also apply to such things as T-1 lines and other leased line facilities. Almost all wireless carriers' networks are interconnected with other carrier networks using T-1 or T-3 level digital lines. T-1s are also used to connect mobile telephone switching offices with remote cell sites.

The LEC's standard tariff for services and facilities can be considered to be the retail prices.

UNEs are the wholesale prices for these same facilities and services. All telecommunications carriers are eligible for UNE pricing according to the FCC's rule §51.307.

Unfortunately, the LECs have fought tooth and nail to keep wireless carriers from using UNE pricing on interconnection facilities. The LECs have maintained that UNEs do not apply to "entrance facilities." These are the trunk lines going from the LEC office to the wireless carrier's point of interconnection. The entrance facility argument is still awaiting an FCC ruling.

LECs use other tactics to discourage the use of UNEs, such as installing (and billing) only the exact ordered parts of the complete circuit. Heaven forbid the hapless wireless carrier should forget to order one small item. You get the bill, but the circuit doesn't work.

In some states, such as Michigan, wireless carriers have asked the state utilities commission to force the LECs to provide UNEs under the same terms and conditions that they offer to CLECs. They hope that this long and expensive process will achieve compliance with the FCC's 1996 order. Many smaller paging and SMR carriers have yet to attain UNE pricing for their interconnection facilities.

Bill and keep

Since the early days of telephony, the originator of a call has been expected to pay for the call to be delivered to the receiving end. In the FCC's 1996 *Local Competition Order*, the FCC went to great lengths to spell out the exact amounts carriers could charge each other for "terminating" calls. In theory, this principle was great news for paging but turned out to be mostly a dud.

The real battles have occurred between cellular carriers and LECs over termination fees. Obviously, when cellular carriers mostly originated calls and, therefore, had to pay the LECs' call termination rates, the LECs wanted to maintain

high fees for terminating calls, even though they had to pay the same fees to cellular carriers to terminate calls from landline to mobile. LECs were happy for a while. But then along came Internet service providers to upset the apple cart. They figured out a way to collect fees for terminating lengthy dial-up Internet calls originated by the LECs' subscribers. The LECs have failed many times to have local Internet calls classified as long distance by state regulators. And after failed attempts

to get Congress to act, the LECs have concentrated their lobbying efforts on the FCC for relief from having to pay instead of collect.

The effort appears to be working. The FCC has proposed a new regime whereby carriers receive no compensation for terminating calls. This is wonderful for a carrier that originates a lot of calls, such as a cellular carrier, but is not so hot for a carrier that only terminates calls, such as a paging carrier. The "bill and keep" FCC proposal not only has caused panic among Internet service providers, but it will certainly cause other telecommunications providers to develop some schemes to take advantage of this new opportunity.

Meanwhile the LECs may not have considered the effect of this FCC proposal on their local measured rate calling revenues when competing carriers can offer unlimited local calling, thanks to the elimination of termination fees. This proposed regime is certain to roil the waters at the FCC.

With all these possibilities for changes in regulation, interconnection's untested waters have many sharks and submerged shoals. ■

Unfortunately, the LECs have fought tooth and nail to keep wireless carriers from using UNE pricing on interconnection facilities. The LECs have maintained that UNEs do not apply to 'entrance facilities.'

MRT

celebrates
years of technology

With this issue, *Mobile Radio Technology* begins its 20th year.

MRT's first year included a pre-launch pilgrimage by Publisher Pat Wiesner and Editor James D. Fahnestock to Motorola in Schaumburg, IL, and E. F. Johnson in Waseca, MN. As private pilots who shared ownership of a twin-engine airplane, they flew themselves to visit two of the companies that shaped the radio communications industry at that time.

They found Motorola with about \$4 billion in annual sales, and maybe a fourth of that from its Land Mobile Products Sector. Today, Motorola has about \$30 billion in sales, with perhaps \$3 billion of that from its Commercial, Industrial and Government Solutions Sector, LMPS' successor.

Cellular came and stayed at Motorola—at least the handsets, if not the switches—but paging has come and gone. The company helped to launch the specialized mobile radio industry and then to convert an individual SMR operator (Fleet Call) into a cellular provider (Nextel Communications). Motorola remains Nextel's only handset and repeater supplier.

Years ago, I toured what was Motorola's brand-new, robotic pager manufacturing facility in Florida. The company announced late last year that it would exit pager manufacturing; it has already exited paging infrastructure manufacturing.

Johnson was probably a bigger company in the early '80s than it is now, but if you were to add back all the business units that it divested through the years, among them amateur radio, electronic components and telemetry, it might be as big today as it was then, or larger. Johnson also helped to start specialized mobile radio, and its LTR protocol became the de facto standard.

Where Motorola has been an acquirer of other companies, Johnson has followed another path. Taken public by the Johnson family in 1959, E. F. Johnson was acquired by Western Union in 1984, Diversified Energy in 1985, Arkla in 1990, Weksel Davies in 1992 and Transcrypt International in 1997. We watched Johnson as cellular came and went—fast—in the company's short-lived partnership with ITT.

Other companies have left the industry since Wiesner and Fahnestock made those first visits. But the two that they chose to visit in those early days continue to lift the industry to new levels.

—Don Bishop

Nextel proposes interference solution

Interference issues have plagued public safety and private radio systems for years. Nextel Communications, Reston, VA, has been the root of many interference problems, however, and now it is proposing a trade to solve these critical communications problems.

In a white paper filed with the FCC, Nextel has proposed a public-private partnership for the "expansion, realignment and further protection of public safety communications." The proposal includes a substantial reallocation of the 800MHz band. The channel blocks used by cellular and other CMRS providers would be separated from those used by public safety communications systems.

It would also double public safety's spectrum allocation at 800MHz, thereby providing opportunities to increase capacity, deploy advanced technologies and enhance interoperability among police, fire and rescue workers.

If adopted, public safety communications systems would have access to a 20MHz block of contiguous spectrum in the lower 800MHz band. This spectrum would be adjacent to the 700MHz frequency band already allocated by the FCC for future public safety usage.

Nextel would exchange 16MHz of its current licensed spectrum to

make the realignment possible. Specifically, Nextel would exchange 4MHz in the 700MHz band, about 8MHz of current SMR spectrum in the lower non-contiguous channels of the 800MHz band, and about 4MHz of spectrum in the 900MHz band.

In return for this spectrum, Nextel would receive 16MHz of spectrum, comprised of 6MHz in the upper 800MHz band and 10MHz in the 2.1GHz band. Nextel's current, contiguous spectrum holdings of 10MHz in the upper 800MHz band would be unaffected.

Under the proposal, Nextel would maintain its net spectrum allocation and does not anticipate any adverse impact on its ability to serve its existing or future customers.

Nextel is also willing to provide financial and other resources to the public safety community to facilitate implementation of the proposal. It would contribute \$500 million to help cover public safety's costs for retuning incumbent operators to the new public safety spectrum block and other expenses associated with the realignment, provided the FCC adopts the proposal substantially as submitted.

Reaction from industry associations has been mixed. See MRT's Web site at www.mrtmag.com for more about their responses.

Contreras wins Radio Club's President's award

Mercy Contreras, publisher of *Mobile Radio Technology*, was chosen to receive the President's Award from the Radio Club of America. Steve Aldinger, the club's president, designated Contreras in recognition of her service and dedication to the organization. She received the award on Nov. 16, 2001, at RCA's 92nd Annual Meeting and Awards Presentation at the New York Athletic Club in New York City.

Contreras is executive vice president of the club, the first woman to



hold that position. She also serves as an executive committee member and is chair of the publications committee. Contreras has served on the corporate advisory committees for APCO and IMSA. She received RCA's Special Services Award in 1996.

At Primedia Business Magazines & Media, Contreras is publisher for the Wireless Technology group of magazines, including *MRT*, *Satellite Broadband*, *RF Design* and *Site Management & Technology* magazines.

Company	Page Number	Fast Fact Number	Advertiser Hotline	Company	Page Number	Fast Fact Number	Advertiser Hotline
Alltec	36	29	800-203-2658	Jotto Desk	35	25	501-636-5776
Anritsu Company	9	10	800-ANR-ITSU	Kenwood Communications ..	29	30	800-950-5005
Astron Corp.	17	17	949-458-7277	Modular Communications Sys.5	6	818-764-1333
Avtec, Inc	19	18	803-892-2181	Newmar Power	25	24	714-751-0488
Berkeley Varitronics	11	11	908-548-3737	OpenSky	1	4	877-OPENSKY
Comms. Specialists	BC	3	800-854-0547	Primedia Business New Media	16A-16H	16	212-204-2622
Control Signal Corp.	36	27	800-521-2203	Pryme Radio	20	19	714-257-0300
CPI Communications	8	9	972-429-7160	Radio Frequency Syst.	15	14	203-630-3311
Crescend Technologies	25	23	800-872-6233	Schwaninger & Associates . IBC	2	202-347-8580
David Clark Co, Inc	16	15	508-751-5800	Telewave Inc.	3	5	650-968-4400
Decibel Products	23	22	214-819-4281	Thunder Eagle	38	28	703-242-0122
Duracomm Corp.	35	26	816-472-5544	Transcrypt International	14	13	800-894-2609
Futurecom	21	20	905-860-5546	Vega/Telex Signaling	6	7	402-467-5321
IDA Corporation	22	21	701-280-1122	VERTEX/YAESU USA	IFC	1	310-404-2700
Iridium	13	12	866-947-4348	Zetron Inc.	7	8	425-820-6363
IWCE 2002	39	800-288-8606				

Spectrum analyzer



Anritsu's MS2711B handheld spectrum analyzer is equipped with an optional built-in preamplifier that measures signal levels down to -115dBm, optional built-in tracking generator, and dedicated one-button measurement capability.

WWW.ANRITSU.COM

Base station controller



The DSPatch base station controller from Avtec is a processor-based remote radio controller capable of providing voice communications and radio control from a central dispatch office. Modes of operation include packet voice (VoFR) with digital backup, leased circuit, dial-up, and digital voice base stations (e.g., APCO P-25).

WWW.AVTECINC.COM

802.11b receiver

Berkeley Varitronics Systems' Locust is an IEEE



802.11b receiver for installation and optimization of WLANs via drive-study analysis. A direction-finding antenna kit option allows users to track and pinpoint sources of interference and unauthorized WLAN users.

WWW.BVSYSTEMS.COM

Crystal, ceramic filters



Low-cost crystal and ceramic filters from Communications Specialists provide relief from interference under part 90 rules. Filters are available in individual or complete conversion kits.

WWW.COM-SPEC.COM

CDM 1550 remote



CPI Communication's MCR211A/MCP201 system gives a remote user control of channel, zone, scan, monitor, intercom and PTT from a distant location.

WWW.CPICOMM.COM

AVL monitoring services



Trakit Nationwide from IDA offers low-cost vehicle location and monitoring services throughout the United States. The service combines GPS and Cellemetry wireless communications with IDA's global tracking data center Web site.

WWW.IDACO.COM

Satellite communications

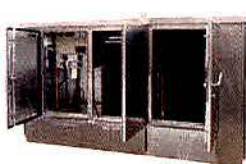


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Iridium Satellite provides global satellite voice and data solutions with complete coverage of the Earth (including the oceans, airways and polar regions). Iridium is suited for users in remote areas where no other form of communications is available.

WWW.IRIDIUM.COM

Self-contained radio site



The OpenSky self-contained radio site from M/A-COM contains trunking base station radios and other network routing and RF equipment to provide cellular coverage. The equipment is housed in an aluminum shelter with air conditioning.

WWW.MACOM.COM

Dispatch consoles



Moducom's Ultracom E9-1-1 radio dispatch console system is cost-effective, digital, 100% user-programmable with pop-up windows and built-in diagnostics. It's a single software application combining radio dispatch and E9-1-1.

WWW.MODUCOM.COM

The Product/Services Showcase contains mobile radio, paging and cellular products and services of advertisers in this issue. Information is provided by the advertisers. For more information on these products, refer to the advertiser's Web address.

Battery module



Eliminate battery back-up installation hassles with **NEWMAR's** battery module system. The 19"/23" rack-mount shelves with slide-in modules and quick-connect wiring enable easy installation and scaling to meet reserve power run time.

WWW.NEWMARTELECOM.COM

Preselectors

Telewave

Tower Top preselectors improve system signal-to-noise ratio, eliminate interference and help overcome cable loss. Standard features include sharp notch filters, dual GaAsFET pre-amps, and single or dual-window combine preselectors.



WWW.TELEWAVE.COM

Control consoles



Telex Communications manufactures Vega control consoles and is now offering the C-1610 six-line tone consoles in a 19" rack-mount version. It is available in two, four or six lines with multiple microphone inputs and two 5W speakers.

WWW.VEGA-SIGNALING.COM

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CIRCLE (25) ON FAST FACT CARD

A company's transition and the clients that followed

Back in the early '70s, SoftWright was a consulting company. As a consultant, Larry Ellis and his partner would write engineering software to help companies solve communications problems. They marketed their services to radio stations that might

need to define listener coverage to promote advertising sales. They also worked with police departments that needed to know to what extent they could get coverage in the city they were protecting.

"In those early days, there were no computer models," Ellis said. "A

calculation might take you six to eight hours for one location. Eventually, people were saying, 'I don't want to pay you \$100 an hour but I sure would like to buy your toys.'"

By the mid-'80s, Ellis and his partner had stopped consulting and had started solely selling software. "We had a great background, and all of the software we sell now came out of the problem-solving arena of the consulting practice," Ellis said.

Today, Ellis is president of SoftWright and manages about 2,500 customers in more than 40 countries. That's about 1,500 independent systems around the world. Some typical SoftWright customers include Black & Veatch and AT&T Wireless. Other customers might surprise you.

For instance, the Mayo Clinic is one of the company's clients. "The Mayo Clinic has a great deal of telecom equipment, and all their clinics have to be in contact with the doctors wherever they are," Ellis said.

The NBA is also a client. If a professional basketball game isn't sold out, the NBA controls which broadcast stations have the right to access the game. It blacks out all the cable companies within a certain coverage area of the primary station that was given the rights to broadcast the game. The NBA uses SoftWright's software to determine whether certain cable companies are inside or outside of the coverage area.

The most interesting patron is the Russian Navy. It uses the software to help guard nuclear weapons against terrorists. "They have massive designs of radio systems all along the shores of northern Russia, where they're warehousing these nuclear weapons," Ellis said. "They do exhaustive studies to find out where the system is reliable. They want to know where they might lack security in the form of radio coverage."

SoftWright's clientele is across the board, and across the world. It proves there's always a new use for an old product.

— Kari Taylor



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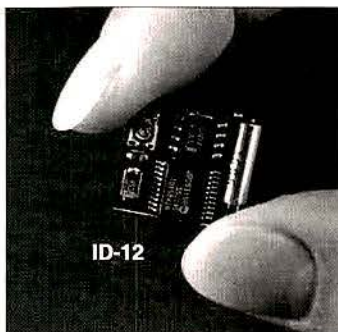
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CIRCLE (27) ON FAST FACT CARD

Radio combines module, processor

The 5100 series from **EF Johnson** includes multiprotocol portable radio that combines an RF module with a high-tiered computer. Designed for durability, the radio offers forward, backward and multiple-protocol compatibility. It allows communications on Project 25 trunking and conventional radio systems, and features field programmability and DTMF compatibility.

WWW.EFJOHNSON.COM



Transceiver offers eight channels

The SCV08 and SCU08 portable transceivers from **SmartComm USA** offer eight channels of operation, CTCSS, DCS, busy channel lockout and high- and low-power settings. These portables are compact, measuring 5 1/4" in height, and come complete with a 1,000-mAh battery, an antenna, a belt-clip and a wall charger.

321-751-9047

Portables now offer scramble mode

TEKK's NT-80 and NT-90 are upgraded versions of its NT-8 and NT-9 5W VHF/UHF synthesized hand-held radios. These radios now offer a standard feature voice scramble mode and design-for-manufacture improvements.

WWW.TEKKINC.COM

Radio meets standards for temp, vibration

Vertex Standard's updated version of its VX-210 portable radio features a high-impact plastic case with 5W RF output and a 16-channel capacity. This radio meets Mil-Std 810 C/D/E/ standards for temperature, vibration, solar radiation and rain. As with the original VS-210 series, intrinsically safe versions are available. The radio

offers user-friendly scanning features including dual watch, priority and follow-me. Also included in each model is Vertex's auto range transponding system, which indicates out-of-range status, helpful in search and rescue.

WWW.VXSTD.COM



Radio provides seamless interoperability

The Guardian series of radios from **Datron World Communications** features the P25 FDMA common air interface standard for interoperability with other P25-compliant radios in federal, state and local radio service pools. These portable radios offer seamless interoperability with conventional wideband systems and narrowband digital systems. They can provide

encrypted and unencrypted operation for as many as four banks, 16 zones and 256 channels within the VHF 136MHz-174MHz frequency range. The shadow channel feature enables communications using any combination of modes for roaming flexibility.

WWW.DTWC.COM



Radio features wide calling range

The **Motorola** HT-1250LS+ portable radio offers UHF LTR trunking capabilities for privacy, a wide calling range, fast channel access, and high user and talk-group capability. The radio also incorpo-

rates Passport trunking. The radio features 15 Passport and/or LTR zones with 16 talkgroups each, 16 conventional channels, seven programmable buttons, voice storage, telephone interconnect, selectable scanning capabilities and user-friendly icons.

WWW.MOTOROLA.COM



Two-way radios offer 32-channel memory

Kenwood's TK-272G/372G UHF/VHF hand-held two-way radios come with a Kenwood charger, high-capacity 1100mAh NiCd battery and a metal-spring belt clip. The radios offer a 32-channel memory capacity, priority scan and integrated QT and DQT signaling. The portables meet the Mil-Std 810 C, D and E for shock vibration, humidity and rain. Kenwood also offers the TK-480/TK-481 800MHz

hand-held radios for the demanding trunking system. These radios offer 32-system and 250-group capacity with cellphone dialing, 10-character alphanumeric, select calling and dot-matrix LCD.

WWW.KENWOOD.NET



Antenna features strong materials

Antenex's fiberglass-enclosed base antennas are for the 2.4GHz band. These 3dB gain antennas have the same outer shell design used in the company's lower-frequency fiberglass-enclosed base stations. They also have a high-gloss, heavy-wall fiberglass radome; a finish-ground, schedule-80, gold anodized aluminum sleeve for mounting; and a gold anodized aluminum cap.

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CIRCLE (28) ON FAST FACT CARD

Terrain software offers 24 modules

SoftWright has released version 4.4 of the Terrain Analysis Package for Windows 9x/NT/W2K. This RF design software consists of 24 modules that, when combined, bring a broad capacity of RF system design to the PC. This software is used to perform evaluations of existing or proposed radio transmitter sites, to predict radio coverage for TV and FM broadcasting, and to design cellular, paging and two-way radio systems. The fundamental module is the basic mapping module, which handles the path terrain profiling



work. For more sophisticated RF studies, the RF facilities module is added.

WWW.SOFTWRIGHT.COM

EMS units works as telephone or tone console

The Vega C-2000 single frequency emergency medical service telephone console from **Telex Communications** is a DSP microprocessor-based, single-line desktop telephone or tone console. This product is designed to operate in ring-down circuit applications using industry standard four-wire SF to E&M



facility equipment. It is encased in durable, plastic housing. Features include a 16-digit dial DTMF keypad, four 10-digit memory locations and a serial port for cloning other C-2000 consoles. It also offers an LED indicating the status of the units and 2W speaker audio.

WWW.VEGA-SIGNALING.COM

Spectrum analyzer covers satellite L-band

The PSA-45DSI spectrum analyzer from **Avcom-Ramsey Technologies** is designed for antenna alignment and L-band signal monitoring. This analyzer features dual input, which allows connection to

two LNBs simultaneously. It covers the 950MHz-1,450MHz band, though signals just outside the band are also visible. The analyzer weighs 8lbs and uses a 6V battery pack.

WWW.AVCOMRAMSEY.COM

Mic headset improves radio comms quality

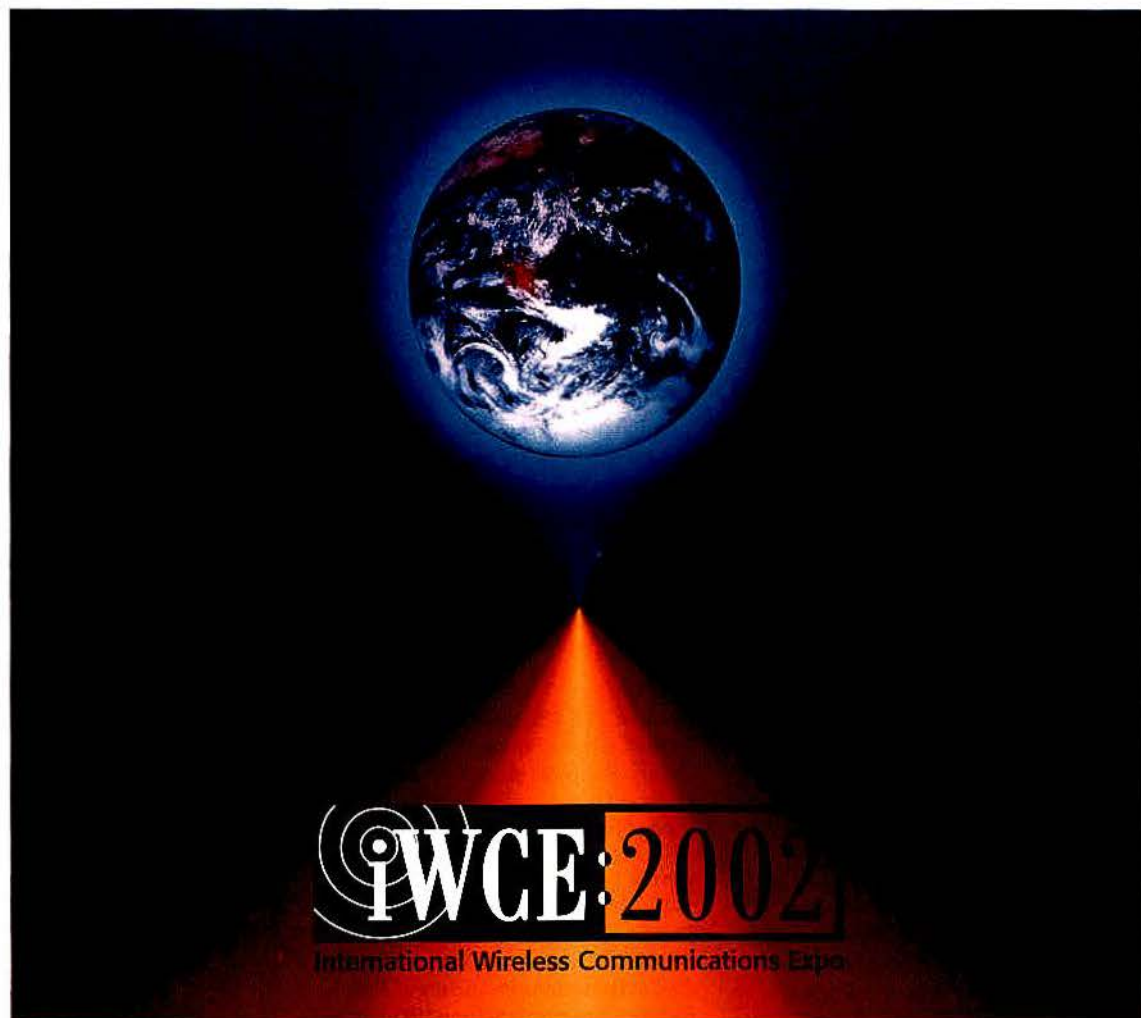
The bone mic tactical headset from **Television Equipment Associates** offers mic intelligibility comparable to boom mics, which improves communications quality. The mic fits totally inside the ear and picks up voice vibrations



from the user's jawbone. The headset mic and receiver are incorporated into a tiny generic ear mold that does not substantially obstruct peripheral hearing and will not interfere with SCBA breathers

WWW.SWATHEADSETS.COM

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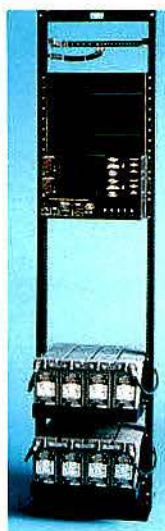
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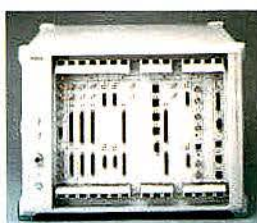


NEWMAR's rackmount power systems are fully assembled at the factory, wired and ready for shipment direct to the communications site. The systems are designed for low-to-medium power applications and were developed for time-critical site build-outs where a single dc power solution is preferred. This system incorporates rectifiers, distribution circuits, metering, status indicators, remote alarm and low voltage battery disconnect. Quick connect plug-in wiring allows change-out of modules without system shutdown.

WWW.NEWMARTELECOM.COM

Signaling tester simulates a base station

The MD8480A W-CDMA signaling tester from **Anritsu** simulates a W-CDMA base station. The tester is useful to verify the modulation and demodulation of the mobile station or chipset, to confirm the call-processing



functionality between the base station and mobile station, and to simulate applications. The tester demodulates the data, then displays and compares it with the data output from the device.

WWW.US.ANRITSU.COM

Antenna platform suited for lattice towers

PiRod's rotatable antenna mounting platform is specifically suited for lattice towers. The design allows it to be positioned to any azimuth independent of tower orientation, making it useful for collocation sites. This platform can be



installed on any guyed or self-supporting tower with straight or tapered lattice sections. Its low profile reduces wind loads. It is available in 13- or 15-foot face widths. A handrail version is also available.

WWW.PIROD.COM

Pack Your Suitcase

January

8-11: International Consumer Electronics Show, sponsored by Consumer Electronics Association, Las Vegas Convention Center, Las Vegas Hilton and Alexis Park Hotel, Las Vegas. www.cesweb.org.

10: Missouri Public Safety Region 24 Planning Committee for 700MHz, Missouri State Highway Patrol General Headquarters second floor meeting room, 9 a.m. Contact: Stephen Devine at 573-526-6105 or sdevine@mail.state.mo.us.

24-25: Wireless E9-1-1 Implementation Plan, presented by APCO and NENA, Omni Mandalay Hotel, Irving, TX. 888-APCO9-1-1 ext. 2454.

February

19-22: NATE, sponsored by the National Association of Tower Erectors, The Rosen Centre Hotel and Orange County Convention Center, Orlando, FL. Contact: 888-882-5865 or www.natehome.com.

26: Region 13 Public Safety Planning Committee for 700MHz, Taylorville Fire Department, Taylorville, IL, 10 a.m. Contact: George Sneyd at 217-558-6444 or sneydgc@isp.state.il.us.

March

18-20: CTIA Wireless 2002, sponsored by the Cellular Telecommunications Industry Association, Orange County Convention Center, Orlando, FL. www.ctiashow.com.

April

7-10: ENTELEC 2002, sponsored by ENTELEC, George R. Brown Convention Center, Houston. www.entelec.org.

23-24: British Association of Public-Safety Communications Officers, organized by Brintex, Novotel London West Convention Center, Hammersmith, London. www.bapco.co.uk.

24-26: International Wireless Communications Expo, co-sponsored by Mobile Radio Technology, Las Vegas Convention Center, Las Vegas. www.iwceexpo.com.

25: Simulcast Forum, Simulcast Solutions, Las Vegas Hilton, Las Vegas. www.simulcastsolutions.com.

May

6-10: Vehicular Technology Spring Conference, sponsored by IEEE, Birmingham-Jefferson Civic Center, Birmingham, AL. www.ieee.org.

15-17: 5th Annual PCIA Tower and

Site Management Forum, Westin Diplomat Resort, Hollywood, FL. www.pcia.com.

20-23: ASCENT Spring Conference, sponsored by the Association of Communications Enterprises, Paris Las Vegas Hotel, Las Vegas. www.ascent.org.

June

2-6: Supercomm, sponsored by TIA and USTA, Georgia World Congress Center, Atlanta. www.usta.org/supercomm.

16-20: NENA, sponsored by National Emergency Number Association, Indianapolis. www.nena9-1-1.org.

23-26: UTC Telecom, sponsored by the United Telecom Council, MGM Grand, Las Vegas. www.utc.org.

August

11-15: APCO Conference & Exposition, sponsored by Association of Public-Safety Communications Officials-International, Opryland Hotel, Nashville, TN. www.apcointl.com.

September

17-20: PCIA GlobalXChange, sponsored by the Personal Communications Industry Association, New Orleans. www.pcia-expoventure.com.

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For information regarding these positions contact: Greg Colson, Phone 936-437-8377.

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Happy New Year. I hope your holiday season was filled with family and fun.

I usually take time off during the holidays to be with my family. We



go to movies, sleep in, go shopping, play games and do just about anything that rings our jingle bells. I especially like playing games. From video games to board games, it doesn't matter. I just love the give

and take games can offer.

One of my favorite memories concerning games involves my time in the Air Force. While assigned to Charleston AFB, SC, I was one of three aircraft maintenance squadron commanders. Each commander was responsible for maintaining the various systems on the aircraft (we had C-141s—a large transport plane). I was the avionics (aircraft electronic systems) squadron commander.

Each Friday evening, the three of us would get together with our wives and play "Trivial Pursuit." It was always the guys against the girls. One evening, in a close game, the guys got the question, "What was the sequel to *The Pink Panther*?" We looked at each other with clueless expressions, each hoping the others knew the answer. No one did.

After stalling as long as possible, I finally came up with *The Return of the Pink Panther*. Bob, our senior officer, looked at me (as the ladies urged us to get on with it) and asked me if I was sure about the answer. I wasn't. But I realized we had to come up with something. If I was wrong, our wives were in a position to win the game on the next roll. Finally, I looked at Bob and said, "We might as well go with it. But it's a shot in the dark." Suddenly, I leaped from my chair and said, "That's the title. It's *A Shot in the Dark*." The ladies each looked at each other in disbelief and frustration. Bob's wife picked up the board

and threw it on the floor. She said something to the effect of: They could beat us, but not *dumb luck*. Years later, all of us love to retell the story and still get a chuckle from it.

I got to thinking about that moment from my Air Force career just before the holidays. What triggered the flashback was a press release I received from Nextel Communications concerning its proposal to the FCC to (paraphrase) "expand, realign and further protect public safety communications." My first thought was, what kind of game was Nextel playing?

Behind Door #1

According to Nextel, the proposal will facilitate two important public safety objectives. The company believes it can provide a framework for mitigating interference to public safety communications from commercial services at 800MHz. Nextel believes this can be accomplished by separating the channel blocks used by cellular and other CMRS providers from those used by public safety communications systems. Second, the company believes it would double public safety's spectrum allocation at 800MHz, providing opportunities to increase capacity, deploy advanced technologies and enhance interoperability among police, fire and rescue personnel.

Nextel believes that a realignment of radio frequencies in the 700MHz, 800MHz and 900MHz bands would "result in a more efficient use of spectrum by all parties." Under Nextel's proposal, public safety communications systems would have access to a 20MHz block of contiguous spectrum in the lower 800MHz band, which they say is more than double public safety's current allocation of 9.5MHz of non-contiguous spectrum at 800MHz.

Behind Door #2

Nextel also proposes to exchange 16MHz of its current licensed

spectrum to make the realignment possible. The company would exchange 4MHz in the 700MHz band, about 8MHz of current SMR spectrum in the lower non-contiguous channels of the 800MHz band, and as much as 4MHz of spectrum in the 900MHz band. In return for this spectrum, Nextel would receive 16MHz of spectrum (6MHz in the upper 800MHz band and 10MHz in the 2.1GHz band).

Behind Door #3

In addition, Nextel is willing to "provide financial and other resources to the public safety community to facilitate implementation of the proposal." The company would contribute as much as \$500 million to help cover the public safety community's costs of "retuning incumbent operators to the new public safety spectrum block and other expenses associated with the realignment, provided the FCC adopts the proposal substantially as submitted."

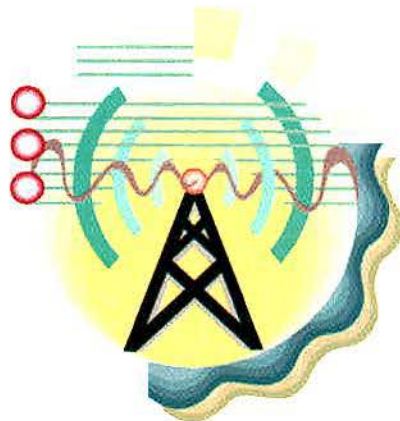
Doesn't this sound like a fun game? Can anybody play? And by anybody, I mean the various public safety agencies, associations and anyone affected by the current problems and potential fixes. The Association of Public-Safety Communications Officials-International and six other public safety agencies have told the FCC that they believe it should proceed with consideration of Nextel's proposal. APCO also believes Nextel is taking a "major step in the right direction."

I agree, but it will be interesting to watch how all the players actually play the realignment game. At this point, my real hope is that Nextel is not taking a shot in the dark but is serious about fixing the problem. We will have to wait and see who the real winners are.

Roger

Editor

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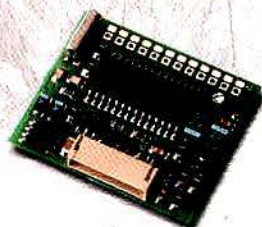
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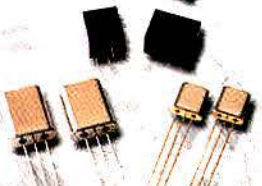
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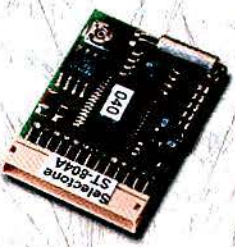
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